

## REMOTELY-MONITORED PERSONAL SAFETY DEVICES

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of priority to U.S. provisional patent application No. 62/908,994, filed Oct. 1, 2019.

### FIELD

[0002] The present disclosure relates to systems and methods for tracking individuals using small handheld and other electronic devices and determining that an individual bearing such a device may require assistance.

### BACKGROUND

[0003] The following description is provided to assist the understanding of the reader. None of the information provided or references cited is admitted to be prior art. Conventional personal safety devices are small electronic devices which may be carried or worn by a user and are capable of communicating with remote monitoring equipment in order to alert others that the user may require assistance. Some such devices and related systems utilize data collected from accelerometers within the devices to infer that the user has fallen and requires assistance. Some such devices also include a button (e.g., a “panic button”) which the user may press to indicate that they require assistance.

### SUMMARY

[0004] In an example embodiment a personal safety device comprises processing circuitry, a radio transmitter, a multi-part button, at least one motion-or-position sensing device, a haptic motor, and an indicator light each coupled to the processing circuitry.

[0005] The processing circuitry is configured to periodically broadcast a signal in a wireless beacon format via the radio transmitter. The signal includes a unique identifier associated with the personal safety device in an identifier field specified by the wireless beacon format and additional information in a data field specified by the wireless beacon format indicating a current state of the personal safety device.

[0006] The processing circuitry is further configured to determine that the personal safety device has experienced a sudden fall based on data received from the least one motion-or-position sensing device and broadcast the signal with the additional information indicating that the current state of the personal safety device is an alarm state.

[0007] The processing circuitry is further configured to determine that the multi-part button has been pressed according to a predetermined sequence, broadcast the signal with the additional information indicating that the current state of the personal safety device is an alarm state, and cause the haptic motor to vibrate according to a predetermined pattern.

[0008] The processing circuitry is further configured place the safety button in a low-power state when the signal is not being broadcast.

[0009] In another example embodiment, a system for monitoring a personal safety device comprises processing circuitry configured to receive a message from one or more

communications devices. The message includes a signal broadcast by a personal safety device according to a wireless beacon format. The signal includes a unique identifier associated with the personal safety device as specified by the wireless beacon format and additional information in a data field specified by the wireless beacon format, the additional information indicating a current state of the personal safety device.

[0010] The processing circuitry is further configured to determine a location of the personal safety device based on at least one of: a location included in the information; and a signal strength of the signal broadcast by the personal safety device as received by the one or more communications devices.

[0011] The processing circuitry is further configured to provide a notification to a user via a user interface that the current state of the personal safety device indicates at least one of the following: that the personal safety device is operating normally; that a battery of the personal safety device requires charging or replacement; and that the personal safety device has triggered an alarm condition.

[0012] When the provided notification indicates that the personal safety device has triggered an alarm condition, the processing circuitry is further configured to receive an instruction from a user via the user interface instructing the processing circuitry to cease providing the notification for a predetermined period of time, and cease providing the notification in response to the instruction until a second message is received including additional information indicating that the personal safety device has triggered a second alarm condition during the predetermined period of time.

[0013] The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the following drawings and the detailed description.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a block-level diagram of an environment in which embodiments disclosed herein may be practiced.

[0015] FIG. 2 is a view of an example personal safety device according to embodiments disclosed herein.

[0016] FIG. 3 is a pair of views of components forming a personal safety device such as the one shown in FIG. 2 according to embodiments disclosed herein.

[0017] FIG. 4 is a series of views of an example enclosure and button cover for the device of FIG. 3.

[0018] FIG. 5 is a series of views showing the spatial relationship between the device of FIG. 3 and the enclosure of FIG. 4.

[0019] FIG. 6 is a circuit schematic illustrating an arrangement of power-supply elements in certain embodiments of a personal safety device such as the embodiments of FIGS. 2 and 3.

[0020] The foregoing and other features of the present disclosure will become more fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict only several embodiments in accordance with the disclosure and are, therefore, not to be considered limiting of its scope, the disclosure will be described with additional specificity and detail through use of the accompanying drawings.